

R E M A R K S

Reconsideration of this application is respectfully requested.

THE SPECIFICATION

The abstract has been amended to better comply with U.S. requirements, as required by the Examiner. It is respectfully requested that the amendments to the abstract be approved and entered, and that the objection to the specification be withdrawn.

THE CLAIMS

Claim 1 has been amended to clarify that the method of the present invention comprises providing multiple ultrasonic transducers, focusing the transducers at the location, simultaneously directing ultrasound waves from the transducers at the location, and selecting a range of parameters of the ultrasound waves being directed from the multiple transducers focused at the location in order to improve a likelihood of cavitation and produce from interference of the ultrasound waves at the location one of the waveforms chosen from a group of three waveforms.

In addition, the claims have been amended to make some minor grammatical improvements and to correct some minor antecedent basis problems.

No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered.

THE PRIOR ART REJECTION

Claims 1-37 were all rejected under 35 USC 102 or 35 USC 103 as being anticipated by USP 5,827,204 ("Grandia et al"), or as being obvious in view of the combination of Grandia et al with one or more of USP 6,508,774 ("Acker et al"), USP 5,219,401 ("Cathignol et al"), USP 6,413,216 ("Cain et al"), USP 4,618,831 ("Egami et al"), and ("Laugharn et al"). These rejections, however, are respectfully traversed in view of the claims as amended hereinabove.

According to the present invention as recited in amended independent claim 1, a method is provided for using ultrasound waves focused at a specific location in a medium to cause localized production of microbubbles at the location, to control the production, and to control cavitation and heating effects that take place at the location. As recited in amended independent claim 1, the method comprises providing multiple ultrasonic transducers, focusing the transducers at said location, and simultaneously directing ultrasound waves from the transducers at said location. In addition, as recited in amended independent claim 1, the method further comprises selecting a

range of parameters of the ultrasound waves being directed from the multiple transducers focused at said location in order to improve a likelihood of cavitation, and to produce from interference of the ultrasound waves at the location one of: a waveform comprising high negative peaks and small positive peaks, said waveform encouraging the creation of a cloud of microbubbles; a waveform encouraging the production of heat and the limitation the growth and possible implosion of said microbubbles; and a combined waveform comprising a spatial and/or temporal combination of two waveforms - one waveform comprising high negative peaks and small positive peaks and the second waveform comprising high positive peaks and only small negative peaks, said combined waveform allowing control of the size distribution of the microbubbles and temporal changes of this distribution.

With this method of the claimed present invention, the range of parameters of the ultrasound waves being simultaneously directed from the multiple transducers focused at the location is selected in order to improve a likelihood of cavitation and to produce from interference of the ultrasound waves at the location one of the recited waveforms. As described in the specification at page 24, first full paragraph, it is the interference of different ultrasound waves (e.g., different in frequency and/or phase) that cause specific waveforms to be produced at the

location at which the different ultrasound waves are focused. Appropriate determination of the parameters of the ultrasound waves enables improved cavitation at the location, e.g., without a significant change in temperature.

It is respectfully submitted that the cited prior art does not disclose, teach or suggest a method of using ultrasound waves focused at a specific location in a medium to cause localized production of microbubbles at that location, to control the production thereof, and to control the cavitation and heating effects that take place at the location, as according to the present invention as recited in amended independent claim 1. In particular, it is respectfully pointed out that the cited prior art does not disclose simultaneously directing ultrasound waves from multiple transducers at a location at which the transducers are focused and selecting a range of parameters of the ultrasound waves in order to improve a likelihood of cavitation and to produce from interference of the ultrasound waves at that location a specific waveform as recited in amended independent claim 1.

Grandia et al describes a medical non-invasive operation using focused modulated high-power ultrasound waves. In Grandia et al, a transmitter excites a multi-frequency ultrasound wave that causes vaporous cavitation bubbles in a small focal zone of a medical target region.

It is respectfully pointed out, however, that Grandia et al does not disclose selecting a range of parameters of the transmitted ultrasound waves in order to improve a likelihood of cavitation and produce from interference of the ultrasound waves at a location at which the ultrasound waves are focused a specific waveform. In particular, Grandia et al fails to teach the selective production of cavitation or of heating in a small zone, obtained in part by a high frequency component.

The remaining prior art references of record also do not disclose or suggest selecting a range of parameters of ultrasound waves being transmitted simultaneously from multiple transducers in order to improve a likelihood of cavitation and to produce from interference of the ultrasound waves at a location at which the ultrasound waves are focused a specific waveform, as according to the present claimed invention.

In view of the foregoing, it is respectfully submitted that the present invention as recited in amended independent claim 1 and claims 2-37 depending therefrom clearly patentably distinguishes over Grandia et al, taken singly or in combination with any of the other prior art references of record, under 35 USC 102 as well as under 35 USC 103.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

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